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of the bright H_{α} line to appear on the objective prism plates with the 10-inch telescope. These plates usually show a well marked bright H_{α} line in the Harvard "bright $H\beta$ " stars. We secured several observations of the photographic region of the spectrum in 1920 and 1921 with slit spectrographs attached to the large reflectors. These agree in showing an absorption spectrum of Class B5.

Of the following observations, those marked 10-inch are of the H_{α} region with an objective prism; the remainder are of the photographic region with one-prism slit spectrographs.

Date	Instrument	Observer
1920, Sept. 10	10-inch	M
" 12	10 "	M
" 18	10 "	H
" 26	100 "	M
Oct. 26	10 "	H
" 26	100 "	M
1921, Feb. 25	100 "	M
Aug. 23	60 "	H
" 25	100 "	H

The radial velocities as measured from the slit spectrograms apparently range from -29 km to -60 km. These results depend on four or five hydrogen, helium, and magnesium lines which, though narrow, are weak and do not always agree well. The measures may indicate a change in the radial velocity or in the structure of the lines.

It is interesting to note that within half a degree of this star lies another bright-line star of Class B, B. D. $+ 62^{\circ}271$, discovered by us in 1920¹.

PAUL W. MERRILL,
MILTON L. HUMASON.

Pasadena, California, April, 1922.

THERMOCOUPLE OBSERVATIONS ON THE TOTAL RADIATION FROM VARIABLE STARS OF LONG PERIOD

The following list of variable stars of long period and late spectral class with several reference stars of earlier type was observed with the vacuum thermocouple and galvanometer attached to the 100-inch Hooker telescope on April 28, 1922. Confirmatory observations were secured on March 1 and April 29, but as conditions of transparency and seeing were uncertain

¹*Publ. A. S. P.*, **33**, 264, 1921.

on the latter dates, these observations are not combined with those of April 28 in the following table.

The galvanometer deflections were observed on a photographic recording device and the plates thus secured were measured on a measuring machine. In the sixth column of the table these deflections are given in terms of radiometric magnitude, which for convenience, we shall define as the magnitude of a typical A0 star which would give the deflection observed. These values are uncorrected for losses in the transmission through the atmosphere and for losses in the instrument. *Vega* was selected as the A0 star of reference, for which the observed deflection was 42.41 mm. with the sensitivity employed. Thus it would require an A0 star of 1.10 magnitude to give a deflection equal to 17.56, which is that observed for *R Leonis*.

The seventh column gives the visual magnitude minus the radiometric magnitude, which is designated as the *heat index*, and the eighth column gives the ratio of the radiation transmitted by a water cell 1 cm. thick to the total radiation, expressed as a difference in magnitude. The observations on *Betelgeux* were made in full daylight, at 5:00 p. m., and agree well with those made at night. The visual magnitudes of the variable stars were obtained on two nights previous to the thermocouple observations at the 100-inch telescope.

Star	R. A. (1920)	Dec. (1920)	Spect. Type	Vis. Mag.	Radio- metric Mag.	Heat Index	Water cell Absorp- tion
<i>Vega</i>	18 ^h 34 ^m	+38° 42'	Ao	0.14	0.14	0.00	0.32
<i>Altair</i>	19 47	+ 8 39	A5	0.89	0.87	0.02	0.30
<i>Arcturus</i>	14 12	+19 37	Ko	0.24	-0.99	1.23	0.76
<i>Antares</i>	16 24	-26 15	Map	1.22	-1.22	2.44	1.23
<i>Betelgeux</i> . . .	5 51	+ 7 24	Ma	0.97	-1.49	2.4	1.19
<i>α Herculis</i> . . .	7 10	+14 30	Mb	3.5	-0.75	4.2	1.46
Boss 3100	11 44	-26 11	Mc	5.4	2.54	2.9	0.97
13 <i>Sagittae</i> . . .	19 56	+17 15	Mc	5.8	2.73	3.1	1.22
<i>R Cancri</i>	8 11	+12 02	Md8	8.3	2.10	6.2	1.63
<i>R Leonis</i>	9 42	+11 54	Md10	9.2	1.10	8.1	2.19
<i>R Hydrae</i>	13 24	-22 46	Md10	8.0	0.53	7.5	1.96
<i>X Cancri</i>	8 50	+17 37	N	6.5	3.29	3.2	1.22
<i>U Hydrae</i>	10 33	-12 52	N	5.2	2.30	2.9	1.40

It should be noted that *R Leonis* and *R Hydrae* were near minimum visual brightness at the time of observation and it is quite possible that the large heat indices found for these stars is a characteristic feature of this phase. In fact, there was some indication in the case of *α Ceti* that variations in visual brightness were larger than the accompanying changes in total radia-

tion¹. The heat index for α *Ceti* from the observation on December 6, 1921, was 7.7 mag.

The exceptionally large heat index for α *Herculis* which is in agreement with the observations of Coblentz² indicates that it radiates as a star of somewhat later spectral type than that usually assigned to it.

EDISON PETTIT,
S. B. NICHOLSON.

INTERFEROMETER OBSERVATIONS OF STAR DIAMETERS

Observations of stellar diameters made before July 14, 1921, were given in the August, 1921, number of these Publications. Additional measures have since been made on many stars, the greater part of the program being devoted to the calibration of the interferometer beam by means of early type stars having small diameters. Dr. Michelson and the writer will publish provisional results for a dozen stars as soon as adjustments have been made for the troublesome factors of seeing and magnitude.

The values for *Antares* and *Arcturus* remain as published before. *Aldebaran* has shown fringes up to the end of the beam and it is estimated their disappearance would take place in the neighborhood of 22 feet. *Betelgeuse* this season has shown no fringes beyond $8\frac{1}{4}$ feet. As compared with previous observations this might suggest an increase in its apparent diameter, possibly related to the variability in brightness of the star. The quality of the seeing, however, has been poor and no decision can be reached until further measurements have been made.

F. G. PEASE.

Mount Wilson Observatory, May 9, 1922.

SUMMARY OF MOUNT WILSON MAGNETIC OBSERVATIONS OF .. SUN-SPOTS FOR MARCH AND APRIL, 1922

During the last few months several groups with irregular polarity have been observed. Usually the few groups with reversed polarity have been small and unstable but recently some of these have been medium sized spots, stable and of average duration. In view of the approaching minimum this tendency toward reversal is of especial interest.

In March two complex groups, Nos. 1951 and 1953, were both visible on several days. To have two of this type present

¹*Publ. A. S. P.*, **34**, 133, 1922.

²*Lick Observatory Bulletin*, **8**, 104 (No. 266), 1914.